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May 17, 2004

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APPLICATION NUMBER: 60/455,149

FILING DATE: March 17, 2003

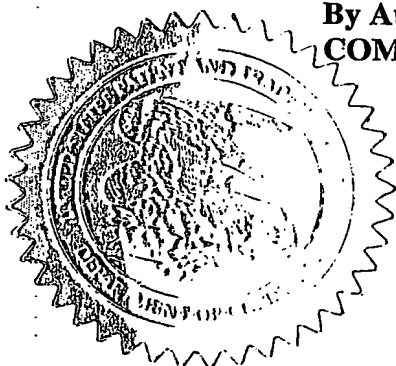
RELATED PCT APPLICATION NUMBER: PCT/US04/08080

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3-18-360455149 .03A/PROV

Atty. Dkt. No. 061300-0291

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Zhou

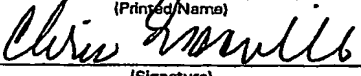
Title: ROTATABLE AND ARTICULATED  
MATERIAL HANDLING  
APPARATUS

Appl. No.: Unknown

Filing Date: 3/17/03

Examiner: Unknown

Art Unit: Unknown

CERTIFICATE OF EXPRESS MAILING	
I hereby certify that this correspondence is being deposited with the United States Postal Service's "Express Mail Post Office To Addressee" service under 37 C.F.R. § 1.10 on the date indicated below and is addressed to: Commissioner for Patents, Washington, D.C. 20231.	
EL 716377227 US (Express Mail Label Number)	3/17/03 (Date of Deposit)
Chris Eggavalle (Printed Name)	
 (Signature)	

**PROVISIONAL PATENT APPLICATION**  
**TRANSMITTAL**

Commissioner for Patents  
Box PROVISIONAL PATENT APPLICATION  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R. § 1.53(c) is the provisional patent application of:

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Atty. Dkt. No. 061300-0291

Enclosed are:

- ☒ Specification (7 pages).
- ☒ Informal drawings (6 sheets, Figures 1-6).
- ☒ Assignment of the invention to Oshkosh Truck Corporation.
- ☒ Assignment Recordation Cover Sheet.
- ☒ Check in the amount of \$40.00 for Assignment recordation.
- ☒ Declaration and Power of Attorney.
- ☒ Application Data Sheet (37 CFR 1.76).

The filing fee is calculated below:

	Rate	Fee Totals
Basic Fee	\$160.00	\$160.00
<input type="checkbox"/> Small Entity Fees Apply (subtract 1/2 of above):	=	\$0.00
<b>TOTAL FILING FEE:</b>	<b>=</b>	<b>\$160.00</b>

- ☒ A check in the amount of \$160.00 to cover the filing fee is enclosed.
- ☒ Further, Applicant, by and through his attorney of record, hereby expressly abandons the application as of the filing date of this letter. This is an abandonment of the application only, and is not to be construed as an abandonment of the invention disclosed in the application. It is respectfully requested that the Office acknowledge abandonment of the application as of the filing date of this letter in a communication mailed to the undersigned.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Assistant Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447.

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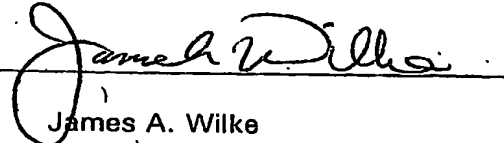
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Respectfully submitted,

Date 3-17-03

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**Application Data Sheet**

**Application Information**

<b>Application Type::</b>	Provisional
<b>Subject Matter::</b>	Utility
<b>Suggested classification::</b>	
<b>Suggested Group Art Unit::</b>	
<b>CD-ROM or CD-R?::</b>	None
<b>Computer Readable Form (CRF)?::</b>	No
<b>Title::</b>	ROTATABLE AND ARTICULATED MATERIAL HANDLING APPARATUS
<b>Attorney Docket Number::</b>	061300-0291
<b>Request for Early Publication?::</b>	No
<b>Request for Non-Publication?::</b>	No
<b>Suggested Drawing Figure::</b>	5
<b>Total Drawing Sheets::</b>	6
<b>Small Entity?::</b>	No
<b>Petition included?::</b>	No
<b>Secrecy Order in Parent Appl.?::</b>	No

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**Domestic Priority Information**

Application::	Continuity Type::	Parent Application::	Parent Filing Date::

**Foreign Priority Information**

Country::	Application number::	Filing Date::	Priority Claimed::

**Assignee Information**

Assignee name:: Oshkosh Truck Corporation

Atty. Dkt. No.: 061300-0291

**U.S. PROVISIONAL PATENT APPLICATION**

**for**

**ROTATABLE AND ARTICULATED MATERIAL HANDLING  
APPARATUS**

Inventors: Zhendong (Mike) Zhou  
Michael Yanacek  
Jon Morrow  
James Gullickson

Atty. Dkt. No.: 061300-0291

## ROTATABLE AND ARTICULATED MATERIAL HANDLING APPARATUS

### BACKGROUND OF THE INVENTION

5       **[0001]** The present invention is concerned with equipment for loading and unloading cargo and more particularly for a rotatable and articulated material handling apparatus mounted on a vehicle.

**[0002]** Equipment used for loading and unloading material, such as cargo containers, typically utilize an L-shaped, hooked arm that  
10 engages the container and pulls it up onto a vehicle. Offloading occurs in the reverse of such procedure to offload a container from a vehicle. Such container manipulating equipment, although may be articulated to a certain degree, more conventionally are fixed with the movable hooked arm that moves in a high arc during at least a portion of the cargo loading  
15 and unloading procedure. Such high arc movement prevents a vehicle equipped with such a cargo handling equipment from loading or unloading an aircraft, such as a C-130 cargo aircraft.

**[0003]** A typical procedure for loading or unloading a C-130 aircraft requires a vehicle carrying the container to offload the container  
20 outside of the aircraft and then requires a second piece of equipment, such as a crane or a forklift truck, to move the container to the aircraft and loading into the aircraft. Such multiple handling is expensive and time consuming.

**[0004]** Thus there is a need for a material handling system that  
25 has an operation range profile that will allow the loading and unloading of aircraft without the need for additional equipment. There is further a need for a material handling system that can load or unload the material

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from the side of a vehicle on which the apparatus is mounted. There is further need for the material handling apparatus that can be used in a push-pull mode.

#### BRIEF DESCRIPTION OF THE DRAWINGS

5           **[0005]** Figure 1 is a perspective view of an exemplary embodiment of an articulated material handling apparatus pivotally mounted on a vehicle.

**[0006]** Figure 2 is a perspective view of an exemplary embodiment of a rotatable and articulated material handling apparatus  
10       mounted on a vehicle.

**[0007]** Figure 3 is a perspective view of the material handling apparatus illustrated in Figure 2 with a riser portion in a vertical position and a boom portion telescopically extended.

**[0008]** Figure 4 is a perspective view of the material handling  
15       apparatus illustrated in Figure 2 with the riser portion and boom portion in a horizontal position and each portion telescopically extended.

**[0009]** Figure 5 is a perspective view of the material handling apparatus illustrated in Figure 2 with the apparatus rotated to a side of the vehicle and with the boom portion extended.

20       **[0010]** Figure 6 is a perspective view of the material handling system illustrated in Figure 2 with the boom portion and a jib portion extending into a cargo space of an aircraft.

#### A SUMMARY AND DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

25       **[0011]** Before beginning a detailed description of exemplary embodiments, several general comments are warranted about the applicability and scope of the present invention.

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[0012] The vehicle illustrated in Figures 1-6 is a truck, however, it should be understood that the vehicle on which the material handling apparatus 20 is mounted can be a trailer or other suitable vehicle. The Figures also illustrates a weight bearing element 7 as being a wheel 8. It should be understood that multiple wheel combinations are within the scope of the present disclosure. For instance, a four or six wheel vehicle can also be used to mount the material handling apparatus 20. It is also contemplated that the weight bearing elements 7 can be a continuous track mounted on wheels. It is also contemplated that the vehicle 5 can be on a track system for instance, railroad or monorail track.

[0013] Figures 1-6 illustrate actuators 25 and telescopic actuators 26. It should be understood that such apparatus can be hydraulic, pneumatic, mechanical, or electrical. Suitable control apparatus motors, pumps, switches, plumbing and wiring components of conventional and suitable kinds can be coupled to the several actuators 25 and telescopic actuators 26 to control the motion of such devices. Such control apparatus can be mounted at convenient locations on the vehicle, for example in a cab of the vehicle or at an operator station located on the vehicle. It is also contemplated that a control apparatus remote from the vehicle 5 can be used, for example, tethered to the vehicle or in communication with the vehicle by radio or light waves.

[0014] Figure 6 illustrates the material handling apparatus 20 mounted on a vehicle 5 as extending into an aircraft A, for example, a C-130. However, it is also contemplated that other types of aircraft can be loaded or unloaded with the present material handling apparatus 20. It is also contemplated that other types of vehicles 5, for example, a railroad car or semi-trailer can be loaded or unloaded by the present material handling apparatus 20.

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[0015] Referring to the Figures 1-6, Figure 1 illustrates an exemplary embodiment of a material handling apparatus 20 pivotably mounted on a support structure 6 of the vehicle 5. It is important to note that the pivoting range can be more than 90 degrees, so that the riser axis can be in either vertical direction or horizontal direction relative to the vehicle 5. The material handling apparatus 20 includes a riser portion 30, a boom portion 40, a jib portion 50 and a hook 60.

[0016] The riser portion 30 includes a riser pivot assembly 32. A plurality of lugs 36 are coupled to the riser portion 30 with a pin 34 engaging the lugs 36 and the support structure 6 of the vehicle 5. It should be understood that other suitable coupling assemblies can be utilized at either a fixed or movable location (translating along the support structure) is contemplated. The riser portion 30 includes a riser base portion 31 and a riser fly portion 33 coupled together by a telescopic actuator 26. It should be understood that telescopic assemblies with more than base and fly portions are contemplated, for example additional extendable portions can be coupled to the riser base, and fly portions. The assemblies perform a telescopic function with a telescopic cylinder, a pulley assembly and flexible member such as a rope, chain or belt.

[0017] Coupled to one end of the riser portion 30 is a boom portion 40. A boom pivot pin 46 can be used to couple the boom portion 40 to the riser portion 30. Articulation of the boom portion is provided by actuators 25. As illustrated in Figure 1, an actuator 25 is coupled to the boom portion 40 and the riser portion 30. More than one actuator 25 can be used. The boom portion 40, includes a boom base portion 42 and a boom fly portion 44 which portions are coupled together with a telescopic actuator 26. Such construction allows the boom fly portion 44 to extend from the boom base portion 42 in a telescopic manner, thereby extending

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the reach of the boom portion 40. It should be understood that telescopic assemblies with more than base and fly portions are contemplated.

[0018] A jib portion 50 is coupled to one end of the boom portion 40. A jib portion 50 includes a jib base section 42 and a jib fly section 54. The jib base section 52 is coupled to the jib fly portion 54 by a telescopic actuator 56. It should be understood that as described above telescopic assemblies with more than base and fly portions are contemplated. Articulation of the jib portion 50 is provided by actuators 25 coupled to the jib portion 50 and the boom portion 40. One end of the jib portion is coupled to a hook 60. The hook 60 can be articulated by suitable actuator coupled to the hook and jib portion 50.

[0019] Figure 2 illustrates an exemplary embodiment of a material handling apparatus 20 as described above but including a rotation assembly 70 mounted between the riser portion 30 and the support structure 6 of the vehicle 5. The rotation assembly 70 allows the material handling apparatus 20 to rotate at least 360 degrees about the rotation bearing 72. Such rotation allows the material handling apparatus 20 to move to one or the other side of the vehicle 5 as illustrated in Figure 5.

[0020] Figure 2 illustrates the material handling apparatus 20 being coupled to the support structure 6 of the vehicle 5 at a fixed point. However, it should be understood that the rotation assembly 70 can be mounted to the support structure 6 on a movable apparatus that will translate along the longitudinal axis of the support structure 6 of the vehicle 5.

[0021] Figures 2-6 illustrate an outrigger assembly 9 deployed to provide stability to the vehicle 5. It should be understood that the use of an outrigger assembly 9 can include additional mechanisms coupled to the vehicle 5 as is necessary or suitable for stabilizing the vehicle 5 during

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operation. For example, additional outriggers can be located at the cab end of the vehicle, or they can be provided with articulated arms or other suitable apparatus.

5       **[0022]** Figures 3-5 illustrate various modes of operation of the material handling apparatus 20 including a telescopic operation of the riser portion 30, boom portion 40 and jib portion 50. It also illustrates an articulation of the jib and boom portions 50, 40.

10       **[0023]** Figure 6 illustrates an exemplary embodiment of a material handling apparatus 20 mounted on a vehicle 5 and extending into a cargo space CS of an aircraft A. The boom portion 40 and jib portion 50 of the material handling apparatus 20 can be telescopically extended into the cargo space CS of the aircraft A to either push or pull cargo into or out of the aircraft A.

15       **[0024]** Other substitutions, modifications, changes and omissions may be made in the design, operating conditions and arrangement of the exemplary embodiments without departing from the spirit of the invention as expressed herein.



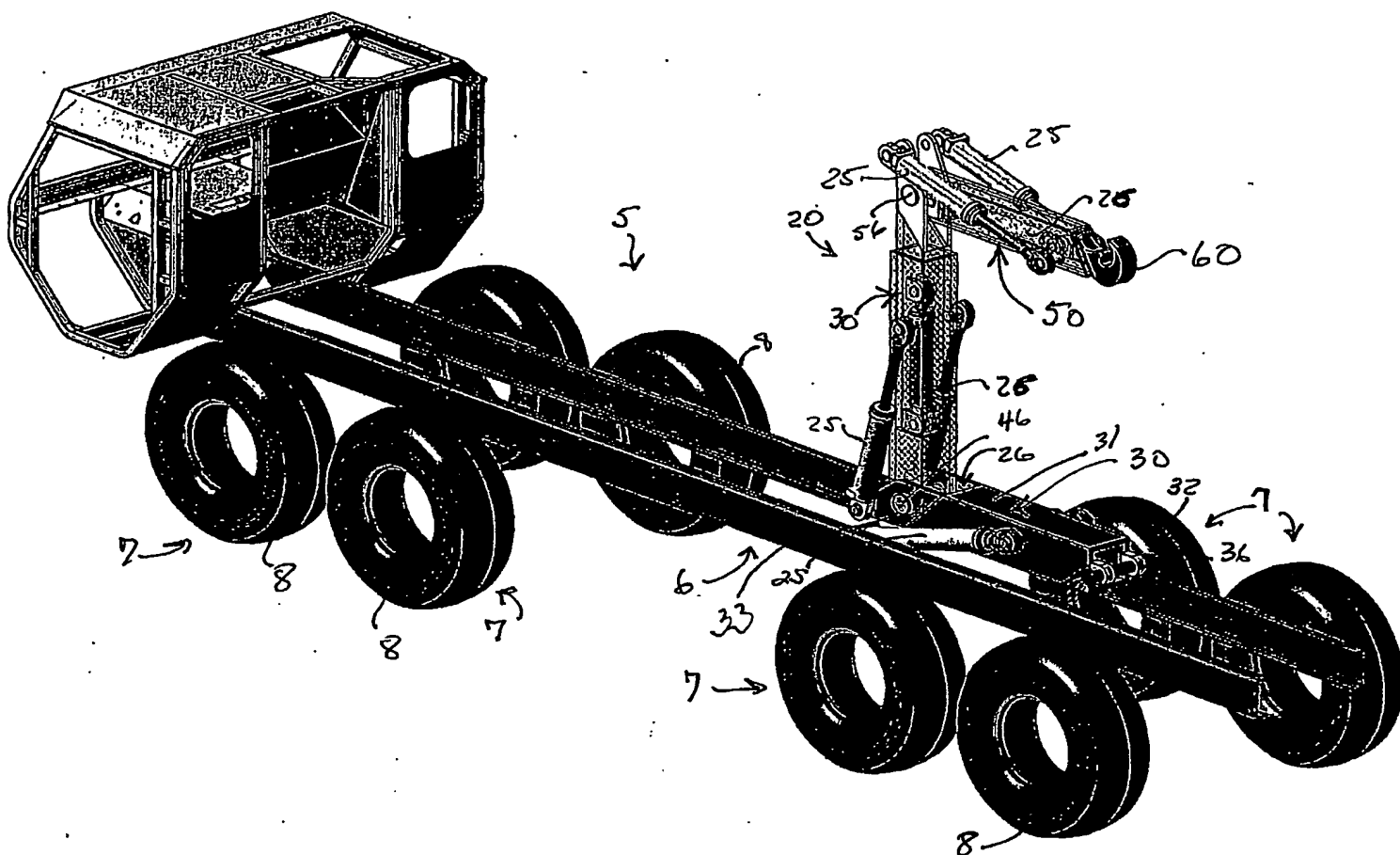


Fig 1

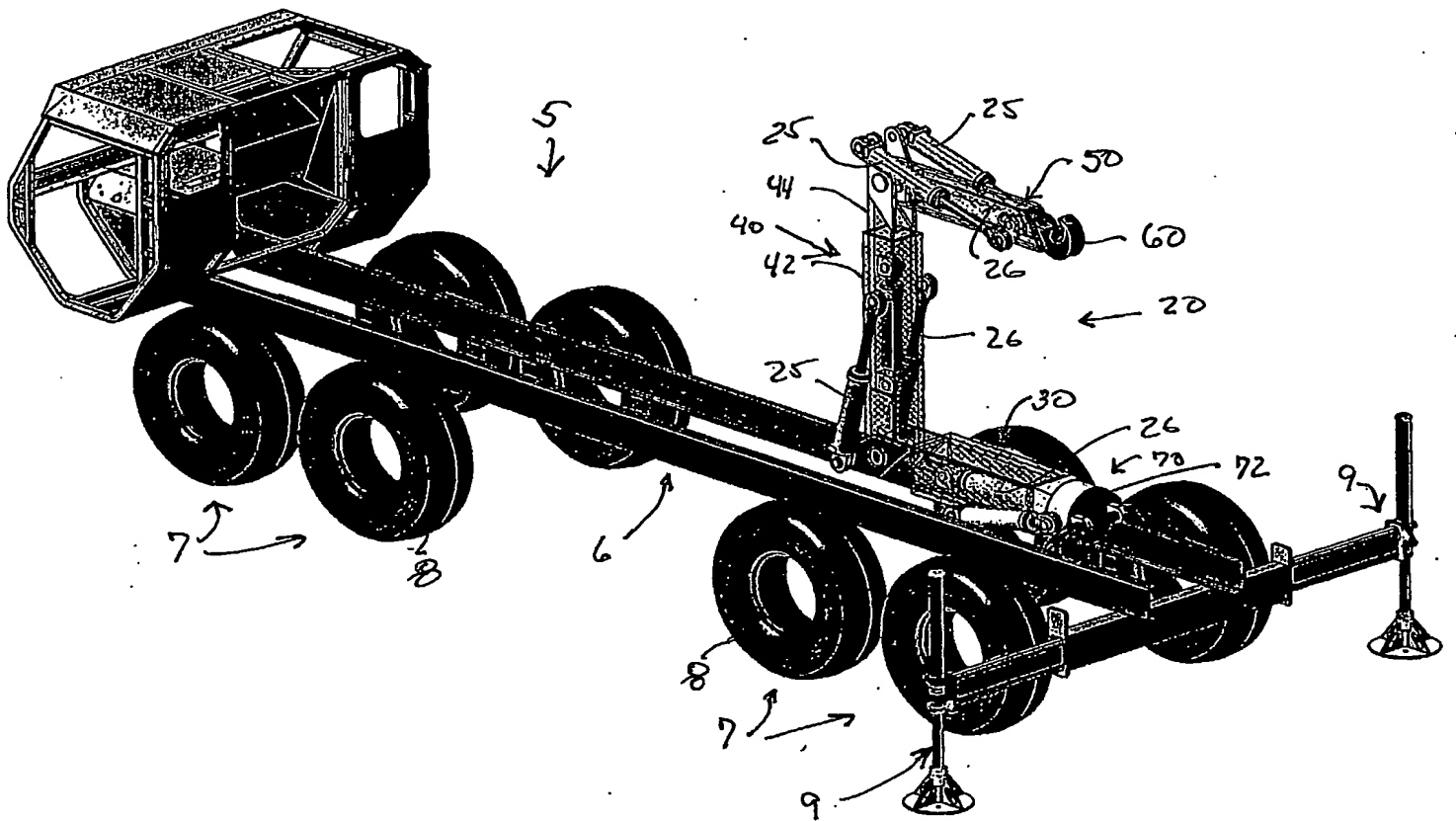


Fig. 2

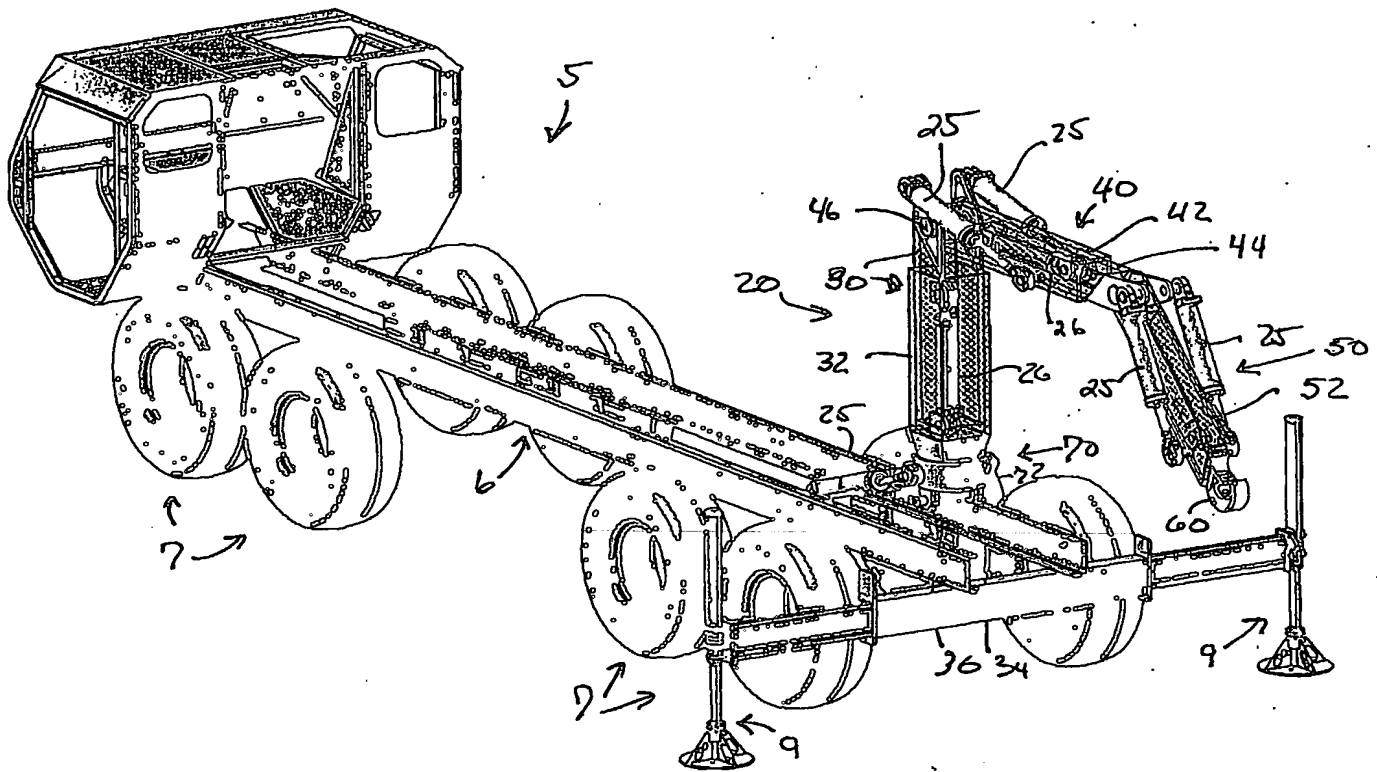


Fig. 3

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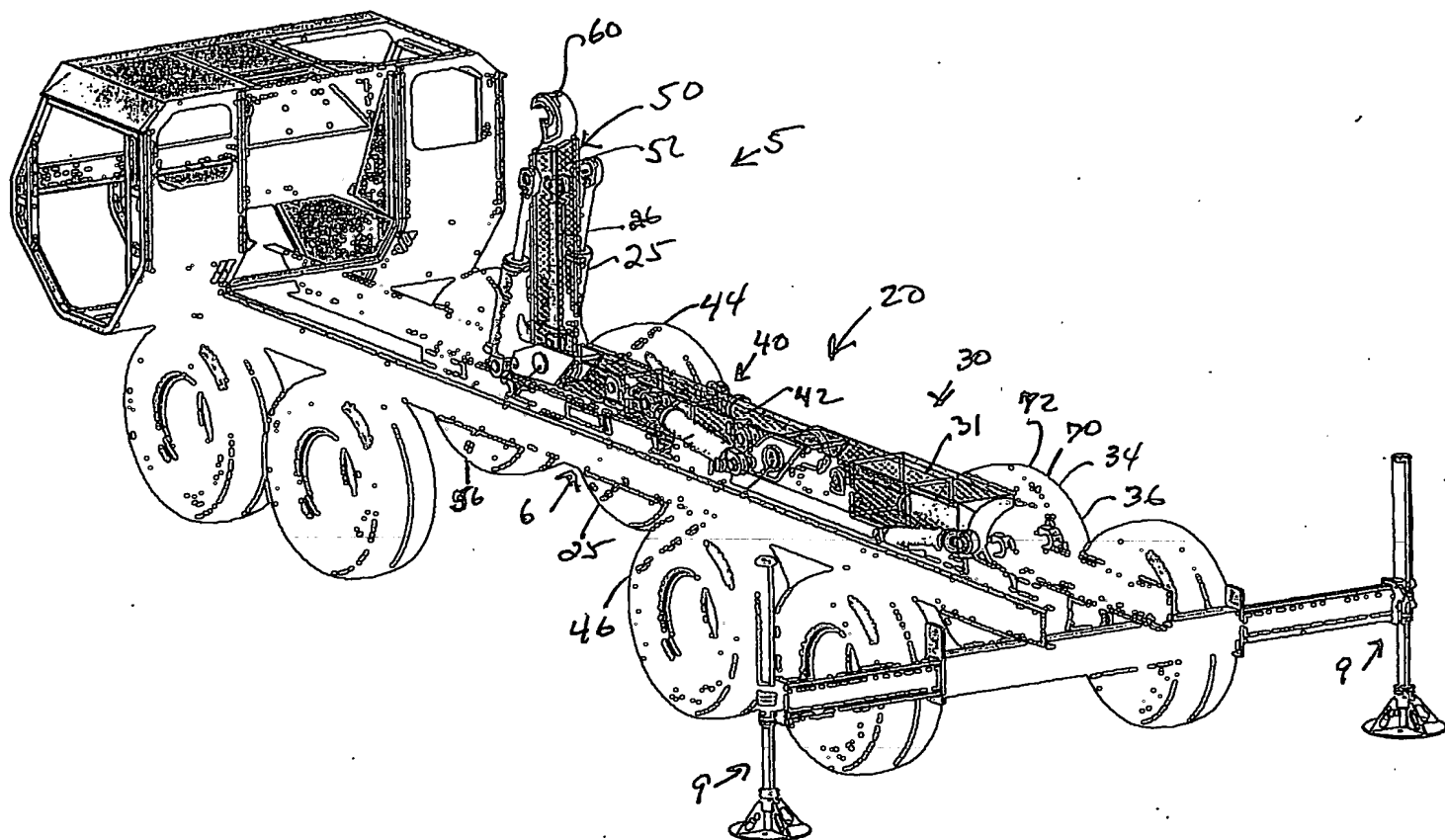


Fig. 4

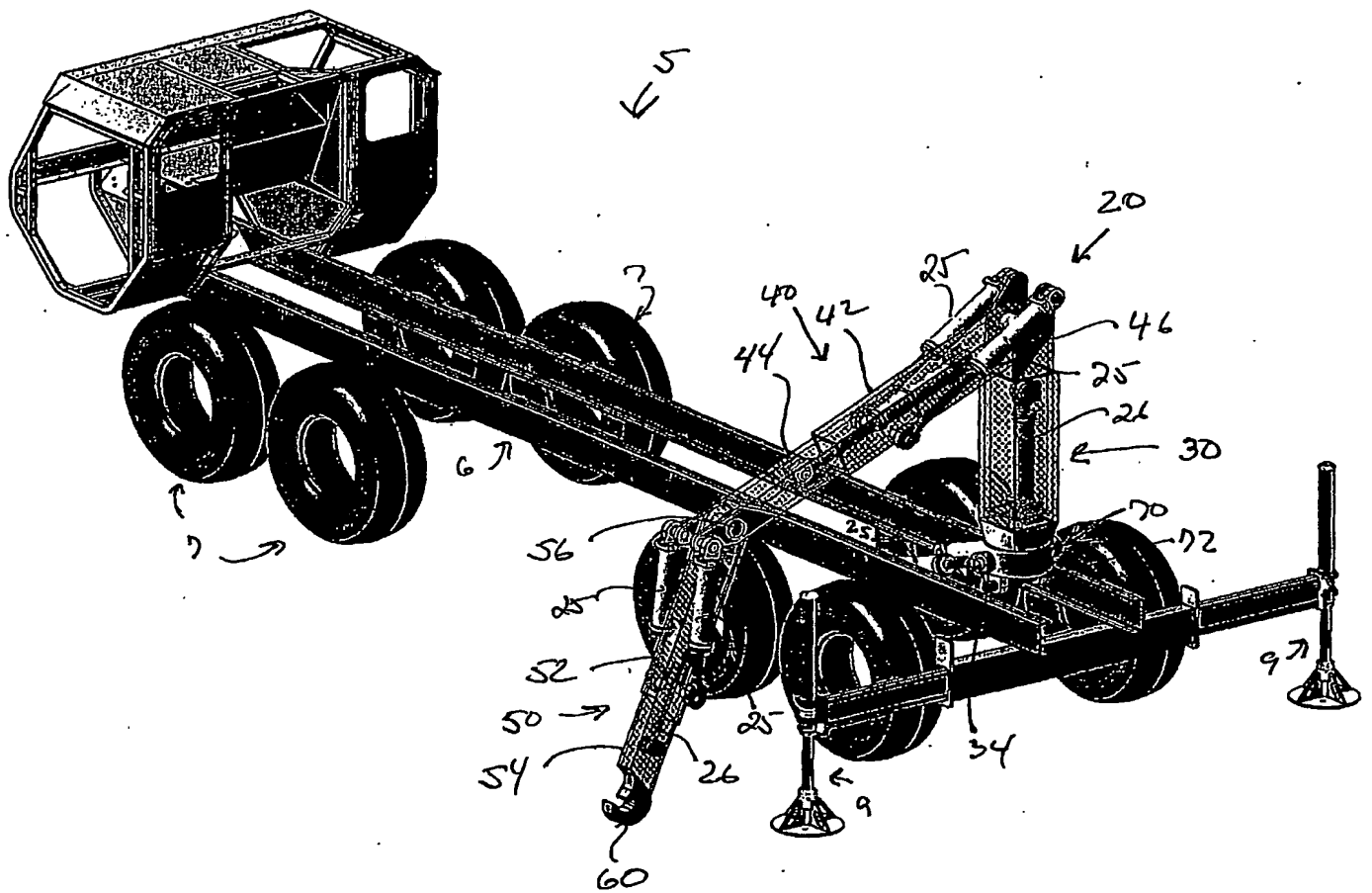


Fig. 5



Fig. 6

Atty. Dkt. No. 061300-0291

**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I HEREBY DECLARE:

THAT my residence, post office address, and citizenship are as stated below next to my name;

THAT I believe I am the original, first, and sole inventor (if only one inventor is named below) or an original, first, and joint inventor (if plural inventors are named below or in an attached Declaration) of the subject matter which is claimed and for which a patent is sought on the invention entitled

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**ROTATABLE AND ARTICULATED MATERIAL HANDLING APPARATUS**

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(Attorney Docket No. 061300-0291)

---

the specification of which (check one)

  X   is attached hereto.

       was filed on        as United States Application Number or PCT International Application Number        and was amended on        (if applicable).

THAT I do not know and do not believe that the same invention was ever known or used by others in the United States of America, or was patented or described in any printed publication in any country, before I (we) invented it;

THAT I do not know and do not believe that the same invention was patented or described in any printed publication in any country, or in public use or on sale in the United States of America, for more than one year prior to the filing date of this United States application;

THAT I do not know and do not believe that the same invention was first patented or made the subject of an inventor's certificate that issued in any country foreign to the United States of America before the filing date of this United States application if the foreign application was filed by me (us), or by my (our) legal representatives or assigns, more than twelve months (six months for design patents) prior to the filing date of this United States application;

THAT I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment specifically referred to above;

THAT I believe that the above-identified specification contains a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention, and sets forth the best mode contemplated by me of carrying out the invention; and

THAT I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

Atty. Dkt. No. 061300-0291

I HEREBY CLAIM foreign priority benefits under Title 35, United States Code § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number	Country	Foreign Filing Date	Priority Claimed?	Certified Copy Attached?

I HEREBY CLAIM the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

U.S. Provisional Application Number	Filing Date

I HEREBY CLAIM the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Application Number	Parent Filing Date	Parent Patent Number

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TODD A. RATHE	Reg. No. 38,276
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CHRISTOPHER M. TUROSKI	Reg. No. 44,456
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JAMES A. WILKE	Reg. No. 34,279
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WALTER E. ZIMMERMAN	Reg. No. 40,883

to have full power to prosecute this application and any continuations, divisions, reissues, and reexaminations thereof, to receive the patent, and to transact all business in the United States Patent and Trademark Office connected therewith.

I request that all correspondence be directed to:

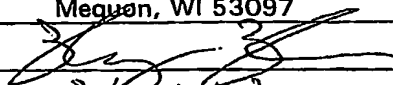
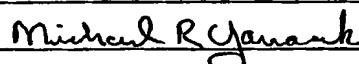
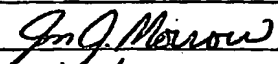
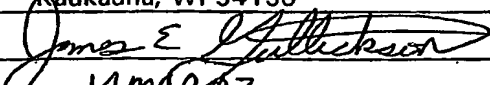
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I UNDERSTAND AND AGREE THAT the foregoing attorneys and agents appointed by me to prosecute this application do not personally represent me or my legal interests, but instead represent the interests of the legal owner(s) of the invention described in this application.

I FURTHER DECLARE THAT all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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